Accident proneness as an expression of self-destructiveness

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Chapter 6

General discussion

Introduction

The main objective of this thesis was to investigate whether accident proneness is an expression of conscious and unconscious self-destructiveness. Since accident proneness has been the subject of many debates in the past decades, we started this thesis with an overview of the literature about definitions and operationalisations of accidents and accident proneness in Chapter 2. In this Chapter, an overall estimate of injury recurrence (observed versus expected) in the general population was calculated for which we included studies that reported empirical data about accident rates. In order to identify specific correlates of accident proneness, we selected injury repeaters who visited the emergency department of the University Medical Center of Groningen (UMCG), The Netherlands. Injury circumstances of these repeaters were compared with those of patients who visited the emergency department only once (Chapter 3). Subsequently, we studied the prevalence of mood and anxiety disorders in injury repeaters compared to a sample of the general population (Chapter 4). Self-harmers were included in the study design to determine the position of accident-prone individuals on a continuum of self-destructiveness (Chapter 5). In this closing Chapter, we will discuss the main findings of our study in relation to the findings of other studies. Finally, we will summarize implications of our findings for clinical practice, public health care, and future research.

Before discussing the main findings of the present study, we first go into a few important methodological issues. We operationalised accident proneness as having two or more unique injuries within a period of 12 months requiring medical treatment at an emergency department. Although this cut off point of injury recurrence in adults has been used in other studies as well (Chapter 2), the results of our study indicated that the group of injury repeaters appeared to be a heterogeneous one. For instance, as

shown in Chapter 3, a number of injury repeaters suffered from injuries that were exclusively due to mere bad luck or to the behaviours of others, whereas injuries of other repeaters were more frequently influenced by their own behaviour. Thus, not all injury repeaters could be marked as accident-prone. Therefore, assuming that accident proneness is an individual susceptibility for injury recurrence, we took the influence of individuals' own behaviour on injury causation into account. This differentiation in the group of injury repeaters was an important strength of the study.

An important limitation of this study is the low response rate within the group of injury repeaters. An explanation may be that injury repeaters were asked to participate in our study between one and a maximum of four years after they had had their first injury. This rather long period of time between the actual injury and our invitation may have resulted in a low response rate. However, non-response analysis showed that this time period did not differ between responders and non-responders of our study. Despite our efforts to maximise the response by sending reminders and by checking addresses with city counsel databases, we were not able to increase the response rate of injury repeaters. The low response rate may have resulted in a selection bias which probably influences the reliability and the generalizibility of the findings of this study. As for selection bias, we found no differences concerning type and location of injury and time of consultation (during the day or night or during the week or weekends) between responders and non-responders. However, as mentioned in the chapters before, responding injury repeaters were older and more frequently female than non-responders. Apparently, younger males were more difficult to reach and they were underrepresented in our sample of injury repeaters. Since the main findings of our study concerned the group of injury repeaters with high-risk behaviours and since this group is

younger and more frequently male than the other injury repeaters, we think that the results of our study are an underestimation of the risk estimates. However, the findings of our study should be interpreted carefully and further research may benefit from, and is needed to, confirm our findings.

Another limitation is that we recruited injury repeaters and self-harmers from a specific emergency department in The Netherlands. Therefore, the generalizability of the study findings to other emergency departments and other countries is limited. For instance, almost all citizens in The Netherlands are health insured, whereas this may be different in other countries. Also, emergency departments may differ from each other in the type of injuries that they are attended for. For instance, urban emergency departments in the US more often treat patients with gunshot wounds than emergency departments in The Netherlands.

A final methodological issue concerns the design of this study. We did find some important correlates of accident proneness. However, injury repeaters were examined after they had experienced their injuries and only the data obtained from the first assessment wave of the SALUT study were used in this thesis. Therefore, no direction or causality of associations could be determined.

Discussion of the main findings in relation to other studies

Accident proneness

This thesis started with a review of the literature about accident proneness (Chapter 2). First, we concluded that the majority of studies focused on accidents which resulted in actual physical injuries, as opposed to accidents not resulting in injuries. On the one hand, this seems to be the re-

sult of a lack of consensus about the concept of accident proneness, since definitions and operationalisations of accident proneness varied highly among the various studies about this topic. To illustrate this, we described the developmental and historical aspects of this concept in Chapter 1 of this thesis. On the other hand, definitions of accident proneness also differed since studies focusing on specific accident circumstances or on accidents in specific (sub-) populations often have different aims. For instance, studies of traffic accidents mainly focus on whether accidents or crashes occur, since accidents resulting in damaged vehicles without personal injuries are also relevant for insurance companies. Second, we concluded that studies reporting about the prevalence of accident repeaters were not comparable due to different observation periods. Still, we were interested in determining whether accident clustering was higher than one would expect by chance alone. While comparing the proportion observed with the proportion expected accident repeaters, we eliminated the methodological problem about different observation periods. Overall, the group of individuals with repeated accidents in a certain period of time was greater than would be expected by chance, whereas the group of individuals without accidents was greater as well. The results of a few other studies that compared observed and expected accident clustering in specific populations confirmed this finding. For instance, in schoolchildren the observed proportion of children with recurrent injuries was slightly larger than the proportion expected on the basis of chance alone (Boyce and Sobolewski, 1989). Jansson et al. (2004) also observed this clustering while studying injuries in the general population.

While this review was the first to present an overall estimate of the ratio between observed and expected accident recurrence, the question what factors might explain this accident clustering remained unanswered. The conclusion that accident proneness, i.e. an accident liability due to per-

sonal enduring characteristics, exists, is an appealing one. However, accident recurrence is also an expression of differences in environmental factors such as exposure to risk. In order to facilitate the identification of accident-prone individuals, it is important to find specific person-related correlates of accident proneness.

Risk factors of accident proneness

Previous studies have revealed that accident proneness is correlated with some specific person-related factors. The findings of these studies have not always been consistent and are often difficult to compare due to different populations and various definitions of accidents and injuries (Chapter 2). In addition, most studies reported about accident or injury occurrence or about accident or injury rates. Only a few studies compared accident or injury repeaters with non-repeaters as we did in our study. Nevertheless, we attempt to give an overview of the literature on correlates and predictors of accident proneness in relation to the findings of our study.

Age and gender

In the general population, higher accident and injury rates were found to be associated with a younger age in adults (Kaufmann et al., 1998; Lindqvist, 1989; Poole et al., 1993; Sayfan and Berlin, 1997; Smith et al., 1992; Williams et al., 1997) as well as in children (Boyce and Sobolewski, 1989; Bradbury et al., 1999; Plumert, 1995). In our study, we also found that injury repeaters were younger compared to a sample of the general population (Chapter 4 and 5) and that they were younger compared to singly injured patients (Chapter 3). The latter finding is consistent with other studies that reported about urban emergency department attendances: younger patients were more likely to have repeated injuries (Hedges et al., 1995; Kaufmann et al., 1998; Smith et al., 1992; Weisbeski Sims et al., 1989). However, results of a few other studies contradicted

this finding. A study that focused on injury rates in 2 to 9 year-old children did not reveal higher injury rates in younger children (Bijttebier et al., 2003), but this study did not distinguish between injury repeaters and non-repeaters. As for injury recurrence, a study that compared single trauma with recurrent trauma patients found no association with age (Ponzer et al., 1999). However, this study included a group of patients with specific injuries, namely only patients who needed inpatient care for their injuries for at least five days. A study in a rural trauma center found that recidivists were older than singly injured patients, revealing a possible different referral pattern in rural emergency departments compared to urban emergency departments (Toschlog et al., 2007).

Higher accident and injury rates were also more frequently found in males compared to females, i.e. in adults (Lindqvist, 1989; Tiesman et al., 2006) and in adolescents (Brook and Heim, 1997) of the general population and in trauma recidivists visiting an emergency department (Caufeild et al., 2004; Hedges et al., 1995; Kaufmann et al., 1998; Madden et al., 1997; Sayfan and Berlin, 1997; Smith et al., 1992). The latter finding was consistent with our finding that injury repeaters were more frequently male compared to the general population (Chapter 4 and 5) and compared to singly injured patients (Chapter 3). Studies of injury recidivism in rural, not urban, emergency departments found no association with gender (Toschlog et al., 2007) or found that trauma recidivists were more often female (Williams et al., 1997). In children, the majority of the studies reported about accident and injury rates (not recurrence). Most studies found higher rates in boys compared to girls (Bijur et al., 1988; Boyce and Sobolewski, 1989; Gallagher et al., 1984; Matheny, 1980; O'Connor et al., 2000; Phillips and Matheny, 1995; Scheidt et al., 1995; Spady et al., 2004). The studies of Bijttebier et al. (2003) and Plumert (1995) revealed no association between injury rate and gender in children.

Risk-taking behaviours

In Chapter 3, we found that injury recurrence was associated with high-risk behaviours such as alcohol and medication use, and aggressiveness. Substance abuse (acute and chronic) and dependence are generally considered as expressions of risk-taking behaviour (Claassen et al., 2007) and they are found to be highly correlated with injury occurrence and recurrence. There are several studies that investigated the relation between alcohol use and injury occurrence. For instance, alcohol abuse and dependence appears to be highly present in patients visiting emergency departments (Cherpitel, 2007; Field et al., 2001; Macdonald et al., 2006; Miller et al., 2001; Rivara et al., 1993; Soderstrom et al., 2001; Watt et al., 2004) and even more in trauma recidivists (Caufeild et al., 2004; Claassen et al., 2007; Ponzer et al., 1999; Toschlog et al., 2007). As for medication use, Furukawa et al. (2000) concluded in a review article that antidepressants combined with benzodiazepines also resulted in higher injury rates. Some other studies showed that drug abuse and dependence also were correlated with injury occurrence (Soderstrom et al., 2001; Toschlog et al., 2007; Weisbeski Sims et al., 1989). The results of these studies were consistent with our finding that alcohol and medication use were associated with injury recurrence. Alcohol use combined with other risk-taking behaviours has been shown to have an even stronger link with injury occurrence (Bazargan-Hejazi et al., 2007). Moreover, a study by Cherpitel (1999) showed that in multivariate analysis including alcohol use and risk-taking behaviours in general, only risk-taking behaviours remained significantly associated with injury occurrence. Therefore, it seems appropriate to unite high-risk behaviours such as aggressiveness and substance use into one category, as we carried out in our study.

In children, it is obvious that other types of risk-taking behaviours were identified, for instance, getting bruises from playing, playing with fire, leaving home without permission, etcetera. Several studies showed that

these risk-taking and sensation-seeking behaviours were related to injury rates in children (Bijttebier et al., 2003; Kennedy and Lipsitt, 1998; Potts et al., 1995). One of the factors that may urge children to engage more in risk-taking behaviours with resulting accidents may be the presence of Attention Deficit Hyperactivity Disorder (ADHD). Indeed, ADHD in children and adolescents has been associated with higher accident rates (Barkley et al., 1993; Brook and Boaz, 2006; DiScala et al., 1998; Farmer and Peterson, 1995) as well as with the risk of a repeat injury (Gayton et al., 1986). ADHD in adults has also been shown to be associated with higher injury rates (Richards et al., 2002; Swensen et al., 2004). In our study, we found that the number of hyperactivity symptoms was positively correlated with the number of injuries that injury repeaters experienced (data not presented in this thesis) (Visser et al., 2004).

As mentioned above, an important finding of our study was that patients' own aggressiveness was more frequently involved in injuries of repeaters compared to singly injured patients (Chapter 3). Ponzer et al. (1999) also reported that repeated trauma patients were more often involved in assault and battery compared to single trauma patients. In 5 and 10 year old children the same association between injury rate and aggressiveness was found (Bijur et al., 1988; Bijur et al., 1986) as well as in psychology students (Plummer and Das, 1973).

Our study revealed that high-risk behaviours of injury repeaters were particularly present in injuries occurring in night life and at home as opposed to sports and work injuries (Chapter 3). This is in accordance with the study of Macdonald et al. (2006), one of the few who related injury cause, i.e. acute alcohol use, with the environment in which injuries occurred. They found that the environment in which the injury occurred determined whether alcohol was involved in injury occurrence of patients vis-

iting an emergency department: a high blood alcohol level was more present in patients who were injured in a bar or restaurant than patients who were injured at school or at work. A previous study reported high-risk behaviour to be related to traffic injury occurrence (Field et al., 2001). We found no difference in the involvement of high-risk behaviours in traffic accidents in repetitively compared to singly injured patients. Although this may suggest that high-risk behaviour in driving is associated with injury occurrence and not with injury recurrence, we have to keep in mind that study population of Field et al. was not comparable with the one in our study, because the selection of patients in their study was based on injury severity. They only included patients who needed to be hospitalised for their injuries for at least 24 hours.

Mental disorders

In our study, mood and anxiety disorders were more prevalent in repeaters with injuries in which their high-risk behaviours were involved compared to the general population. In contrast, the prevalence of mood and anxiety disorders in repeaters with injuries that occurred without the involvement of high-risk behaviours was not higher than the prevalence of these disorders in the general population (Chapter 4). Partly, this is in accordance with the study of Wan et al. (2006), in which mentally ill trauma victims were more likely to experience recurrent trauma than non-mentally ill trauma victims. However, their study differed from ours because the presence of a mental illness was extracted from a mental health treatment registry and not by diagnostic interviews, and because this study did not differentiate between injury circumstances of repeaters.

Few studies found associations between psychopathology and unintentional injuries. In a population cohort, Tiesman (2006) reported that depressive symptoms were risk factors for unintentional injuries (not necessarily requiring medical treatment). Also, trauma victims with uninten-

tional injuries had a higher incidence of lifetime psychopathology compared to hospital-based controls (Poole et al., 1997). In children and adolescents, no association between depression and injury recurrence was shown (Einfalt-Somen and Vidovic, 2003). Overall, McDonald et al. (1996) summarized in a review article that accidental injuries in adults are generally associated with personality and substance use disorders, but not with mood and anxiety disorders. However, their review focused on accident occurrence, not on accident recurrence.

As mentioned earlier, injury recurrence is associated with substance use disorders such as alcohol dependence. The comorbidity of substance use disorders with mood and anxiety disorders is often high. Therefore, we investigated whether the relation between injury recurrence and mood and anxiety disorders was influenced by alcohol dependence. We found that the association between high-risk injury recurrence and mood and anxiety disorders remained significant when alcohol dependence was taken into account.

Accident proneness on the continuum of self-destructiveness

We theorise that susceptibilities for recurrent unintentional injuries and intentional injuries may have the same correlates. The results of our study reveal that the prototypic accident-prone individual is a young male with high-risk behaviours and a mood or anxiety disorder. Previous research has shown that an increased risk of suicide is also associated with younger age, mood disorders, and substance abuse and dependence in a sample of the general population (Bernal et al., 2006). Recent research about suicide completion in depressed males revealed that alcohol dependence and impulsive-aggressive personality disorders were independently associated with suicide risk (Dumais et al., 2005). The overlap between suicide and unintentional injury recurrence is reflected by the fact that suicidal and

accidental deaths are often difficult to distinguish (Barraclough, 1974; Connolly et al., 1995; Holinger, 1980; McGuire, 1976) and that they share risk factors such as conduct and emotional disorders (Neeleman et al., 1998). However, an important difference between these groups is that suicide attempters are more frequently female (Bernal et al., 2006; Kessler et al., 1999) whereas accident-prone individuals are more frequently male compared to the general population. It can be hypothesised that self-destructiveness in males more often leads to risk-taking behaviours, whereas self-destructiveness in females more often leads to suicidal behaviours.

This leads us to Chapter 5, in which we compared injury repeaters and self-harmers with the general population on self-destructive tendencies such as suicidality and unhealthy lifestyle characteristics. Injury repeaters, in particular those with injuries in which their own high-risk behaviours were involved, had more self-destructive tendencies than subjects of the general population. Self-harmers were, as expected, even more self-destructive. Thus, high-risk injury repeaters could be placed between the general population and self-harmers on a continuum of self-destructiveness. The existence of such a continuum has been suggested before (Firestone and Seiden, 1990; Neeleman et al., 1998; Neeleman, 2001a). That accident proneness can be associated with suicide proneness in young adults has also been shown by the results of a study of Williams and Nickels (1969). However, Plummer and Das (1973) did not find an association between suicidal ideation and accident risk. Claassen et al. (2007) studied the association between injury recidivism and suicide attempts, and they found no higher prevalence of lifetime suicide attempts in injury recidivists compared to singly injured patients attending an emergency department. However, it should be noted that this study used

a rather large recidivism window of 8 years, questioning the fact to which extent their injury recidivists were accident-prone.

Implications of this study

This thesis revealed that injury recurrence, in particular when high-risk behaviours such as aggressiveness or substance use were involved, is associated with a higher prevalence of mood and anxiety disorders and also with self-destructive tendencies, such as suicidality and an unhealthy lifestyle. These findings have implications for further research, public health, and clinical practice.

Longitudinal research is needed to determine predictors of accident proneness. Based on the results of our study, we have some recommendations for future research on accident proneness. First, studies should use comparable definitions of accident proneness. In addition, further research is needed to establish an empirically based threshold for caseness that may serve as a gold standard for future studies towards accident proneness. Second, while studying accident proneness, accident circumstances should be taken into account in order to determine the role of person-related or environment-related factors on accident or injury recurrence. This approach may overcome the methodological problem that the group of injured individuals is a heterogeneous one, i.e. some may have recurrent accidents due to mere bad luck or behaviours of others whereas others have accidents that are mainly influenced by their own behaviours. Finally, in order to provide tools for clinical practice, screening and intervention programs aimed to reduce high-risk and self-destructive behaviours in accident-prone individuals based on the proposed longitudinal studies should be developed and investigated.

This study also has implications for public health. First, accident-prone individuals use a disproportionate part of medical services due to their recurrent injuries. Moreover, our findings imply that accident-prone individuals, because of their unhealthy lifestyle, may be at risk for somatic health problems as well. In general, we consider accident or injury proneness a stable individual feature as part of a biopsychosocial liability to ill-health. Accident proneness may also reflect a temporary state due to life stress or ill-health, including health problems due to prior injuries. In either case, the targeting of underlying risk factors may prevent, in addition to accident recurrence, other future psychiatric and somatic health problems, hereby reducing the burden on health care facilities.

Concerning clinical practice, physicians, nurses, or other care providers at the emergency department have the perfect opportunity to screen patients on high-risk and self-destructive behaviours. This way, they can identify patients who are likely to experience more injuries in the near future. However, screening for high-risk behaviours and unhealthy lifestyles is often not part of standard protocols in emergency departments, not to mention additional counselling aimed to reduce the number of injuries in the future. Examples of counselling may include referral to alcohol intervention programs, the promotion of a healthier lifestyle, or if applicable, encouragement of patients to seek treatment for mental illnesses such as mood or anxiety disorders.